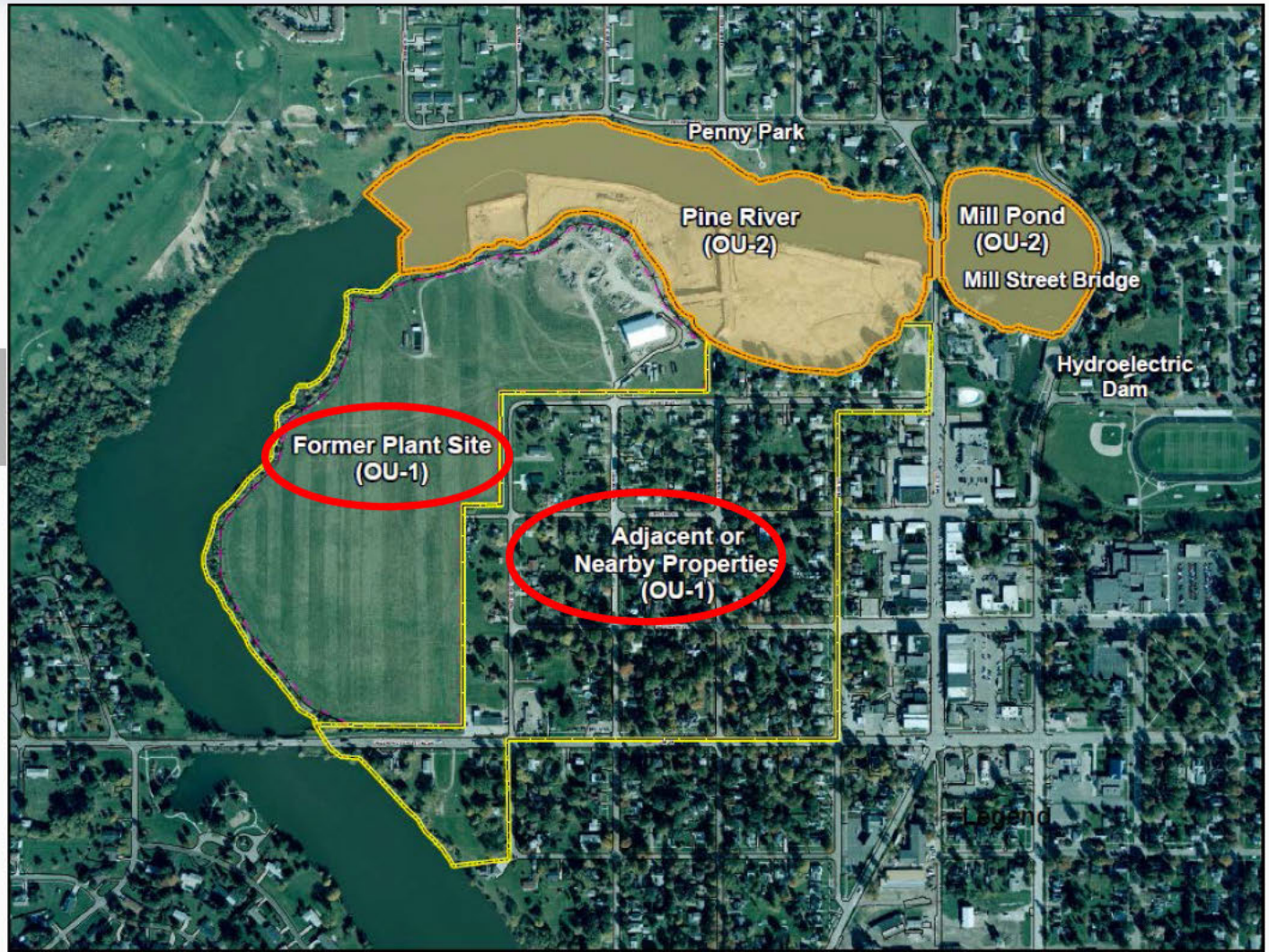
Velsicol Chemical Plant Site Briefing

June 27, 2012

Velsicol Site



Michigan Chemical Operations

Michigan Chemical Company (1939 to 1978)

- Owned by Velsicol Chemical Corporation starting in 1965
- Manufactured variety of chemicals
- Accidental mixing of PBB with animal feed in 1973
- 1978 Plant Closure
- 1982 Consent Judgment

1982 Consent Judgment Remedy

- USEPA and State of Michigan entered Consent Judgment with Velsicol in 1982
- Included limited release from liability
- 52-acre plant site was demolished and contained with a slurry wall and clay cap
- Consolidated waste material from Former Burn Area under cap
- Completed by 1986

Bankruptcy Settlement

- 1999 complicated bankruptcy filing
- 2002 settlement vested title to site property in newly established bankruptcy trusts
- Trusts currently hold title to property and settlement proceeds. Of those proceeds approximately $6M are available to US EPA.

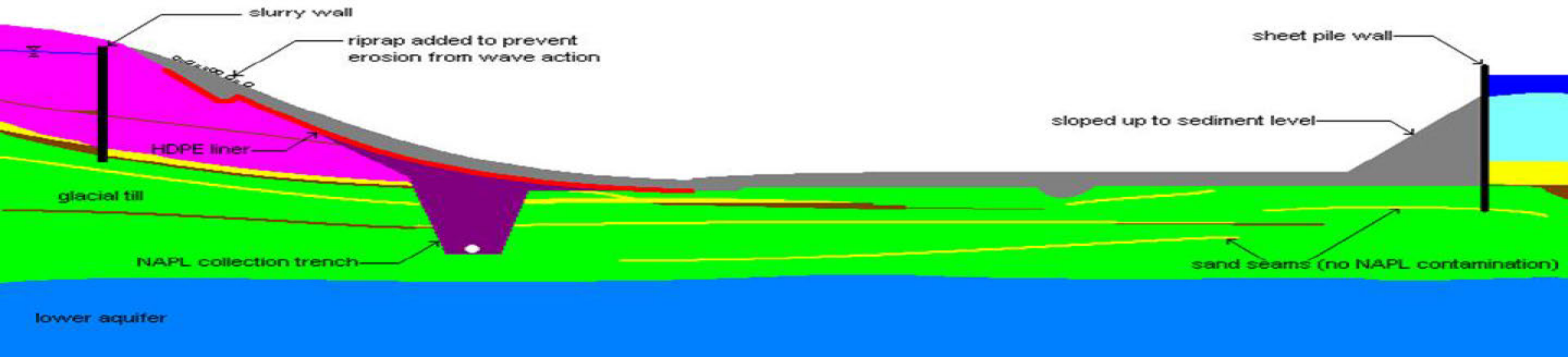
Pine River Cleanup

- *8 years*
- *670,000 cubic yards stabilized sediment disposed at licensed landfills*
- *$100,000,000*

Two different types of DNAPL

- *"Hot Spot Cell" DNAPL*
  - *Primarily DDT with chlorobenzene*
- *"Area 3" DNAPL*
  - *High percentage of bromine determined from elemental analysis*
  - *Approximately 70 mg/kg total VOCs in associated groundwater*

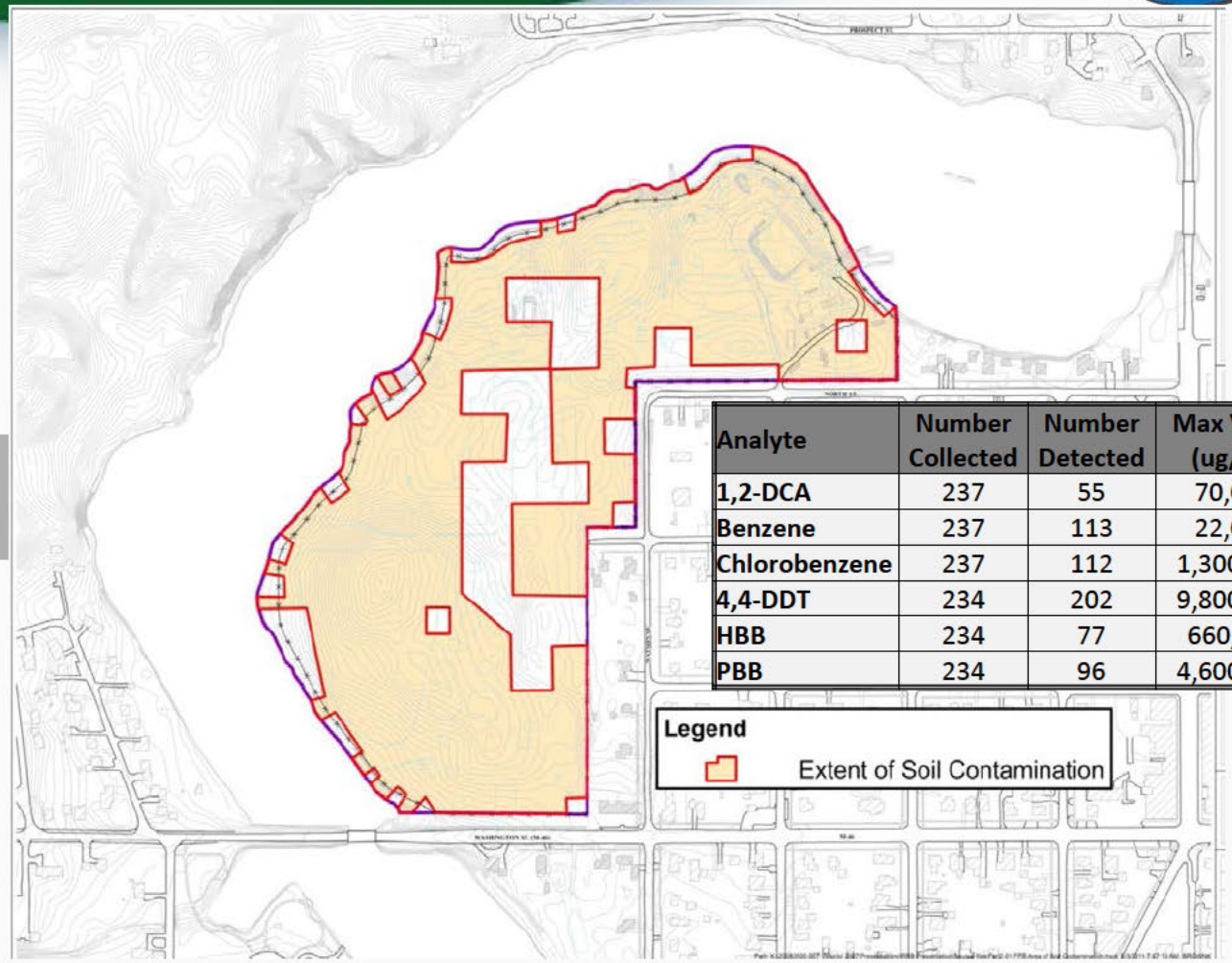
River water
Riverbank
Glacial till
Sediment
Sand and/or gravel layer
Lower aquifer
NAPL
Granular trench fill
HDPE liner
Imported clay



Remedial Investigation Summary

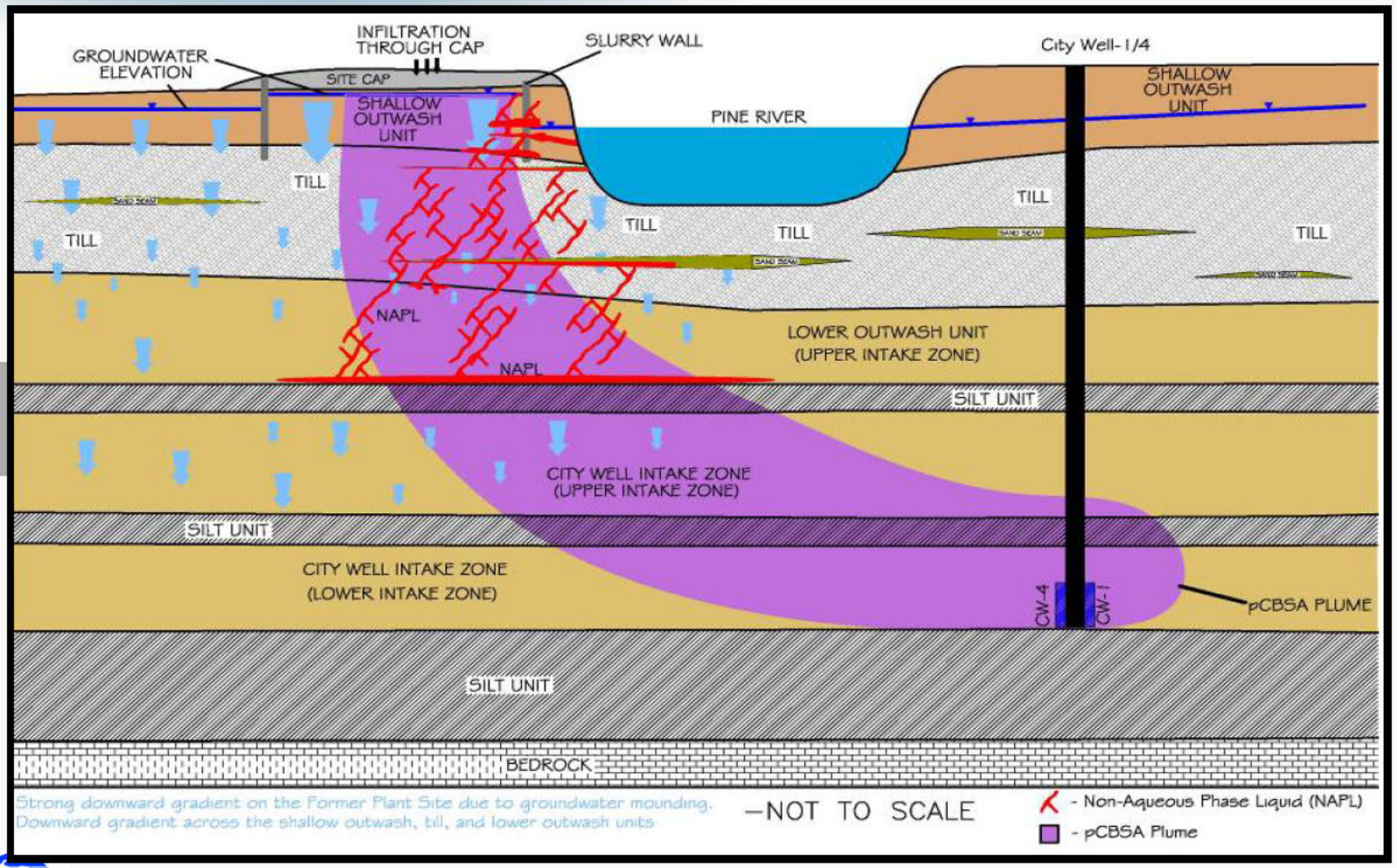
- 1982 remedy not functioning as designed
- Containment system evaluation (cap, slurry wall, till)
- 163 monitoring wells
- 467 soil borings
- 7 rounds of groundwater monitoring for RI
- Residential Well Sampling
- Adjacent and Nearby Properties
- $8,000,000

Former Plant Site – Soil

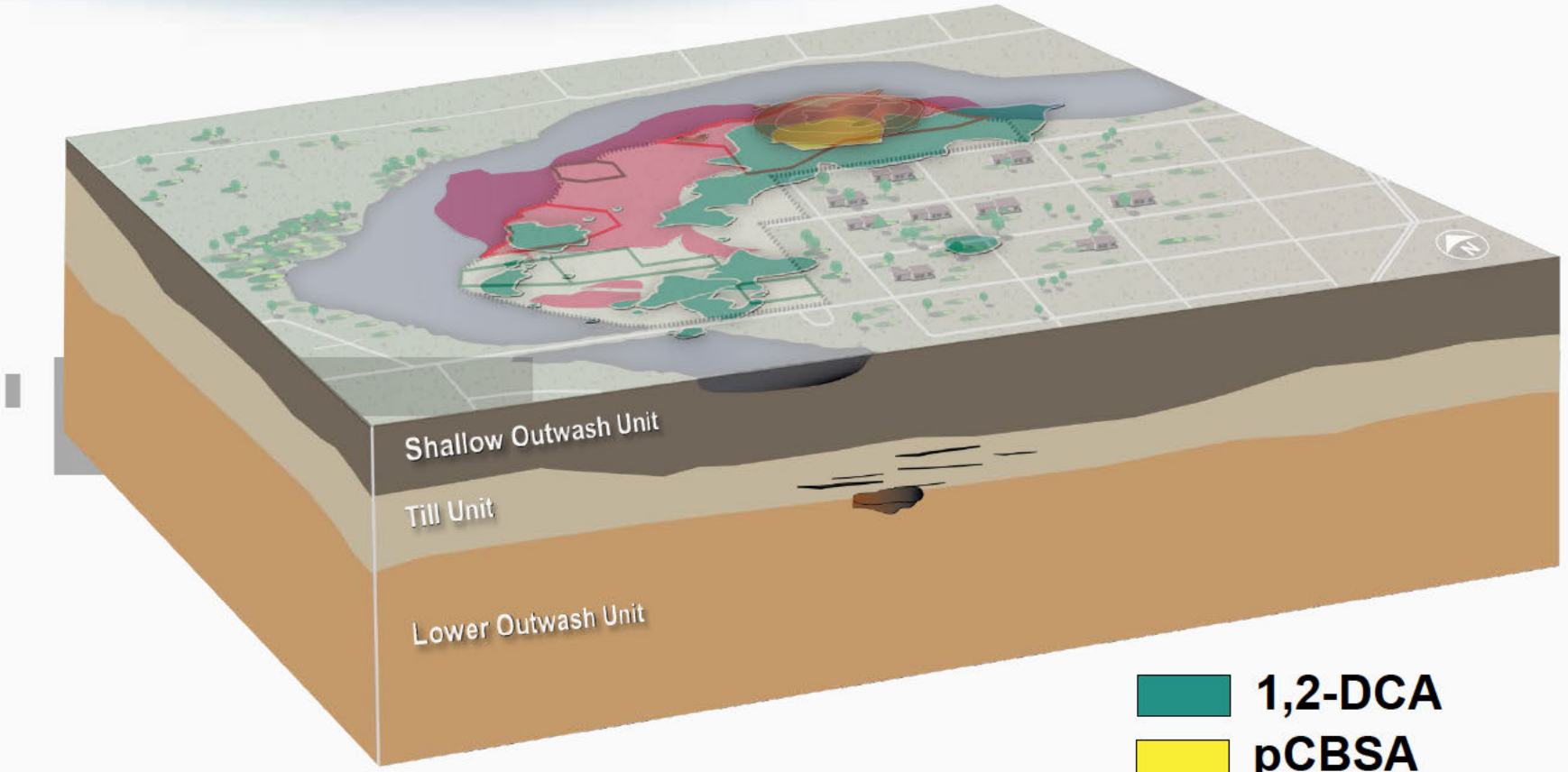


Analyte	Number Collected	Number Detected	Max Value (ug/kg)
1,2-DCA	237	55	70,000
Benzene	237	113	22,000
Chlorobenzene	237	112	1,300,000
4,4-DDT	234	202	9,800,000
HBB	234	77	660,000
PBB	234	96	4,600,000

Study Area Cross Section

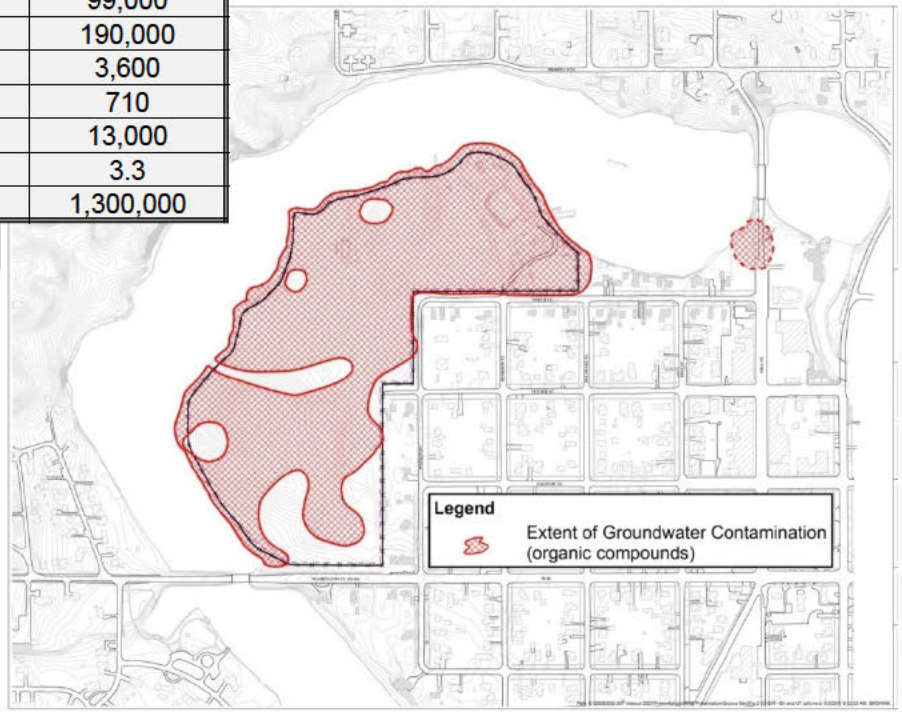


Velsicol Groundwater Contamination



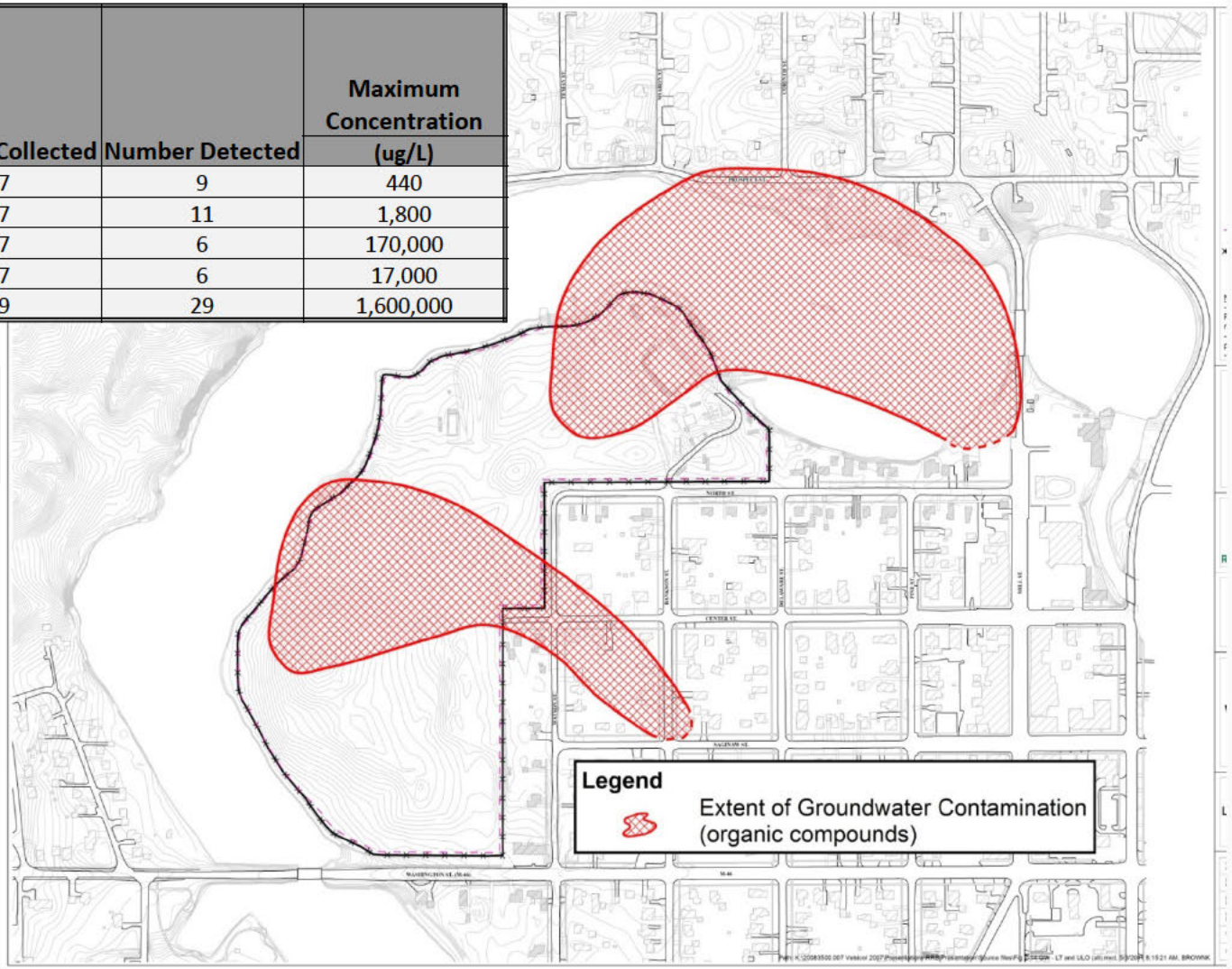
Shallow Outwash and Upper Till Unit

Analyte	Number Collected	Number Detected	Maximum Concentration (ug/L)
1,2-DCA	267	92	530,000
Benzene	267	166	99,000
Chlorobenzene	267	134	190,000
Trichloroethene	267	82	3,600
Vinyl Chloride	267	69	710
4,4-DDT	243	94	13,000
PBB	244	26	3.3
pCBSA	164	104	1,300,000



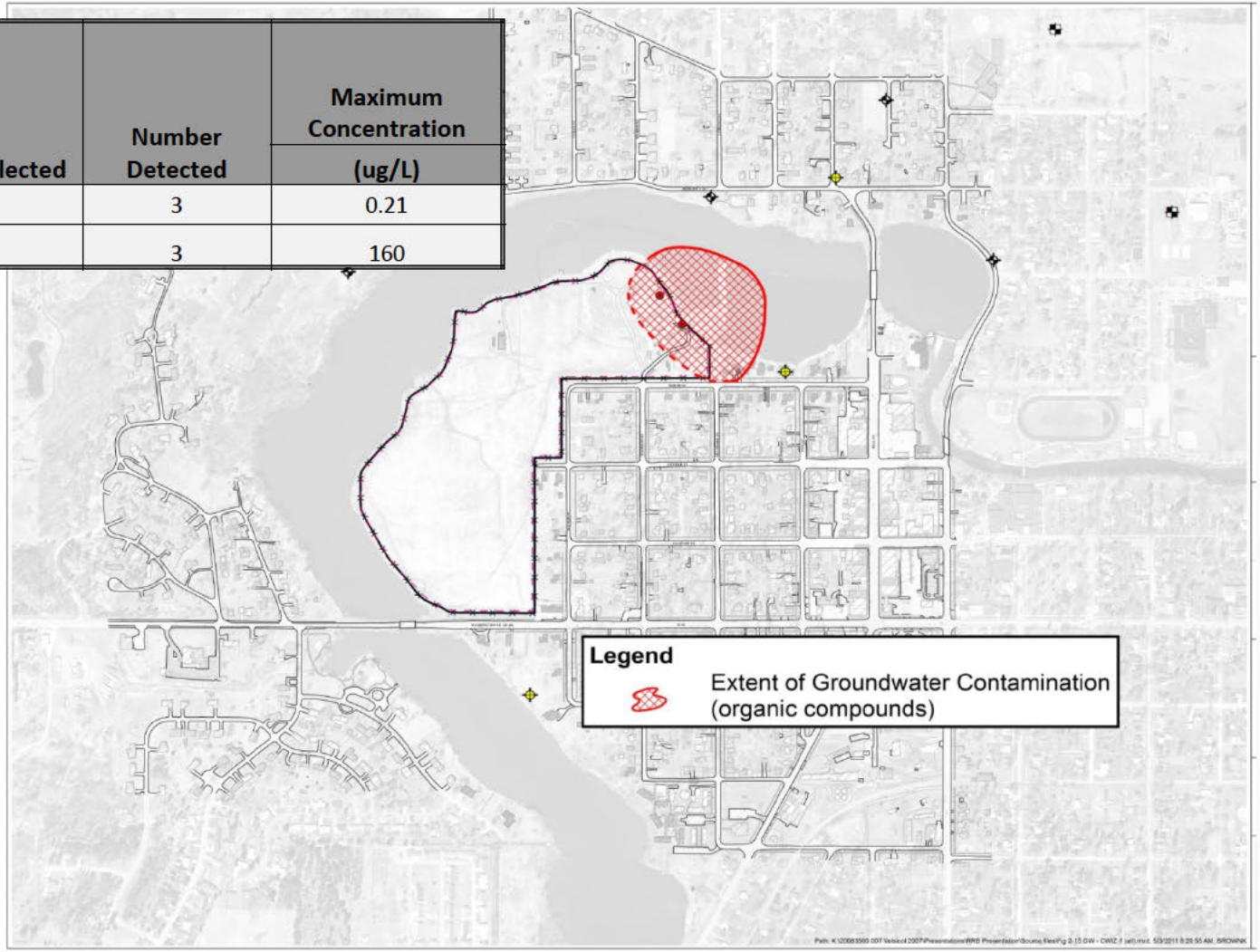
Lower Till Unit and Upper Lower Outwash

Analyte	Number Collected	Number Detected	Maximum Concentration (ug/L)
1,2-DCA	57	9	440
Benzene	57	11	1,800
Chlorobenzene	57	6	170,000
4,4-DDT	57	6	17,000
pCBSA	59	29	1,600,000



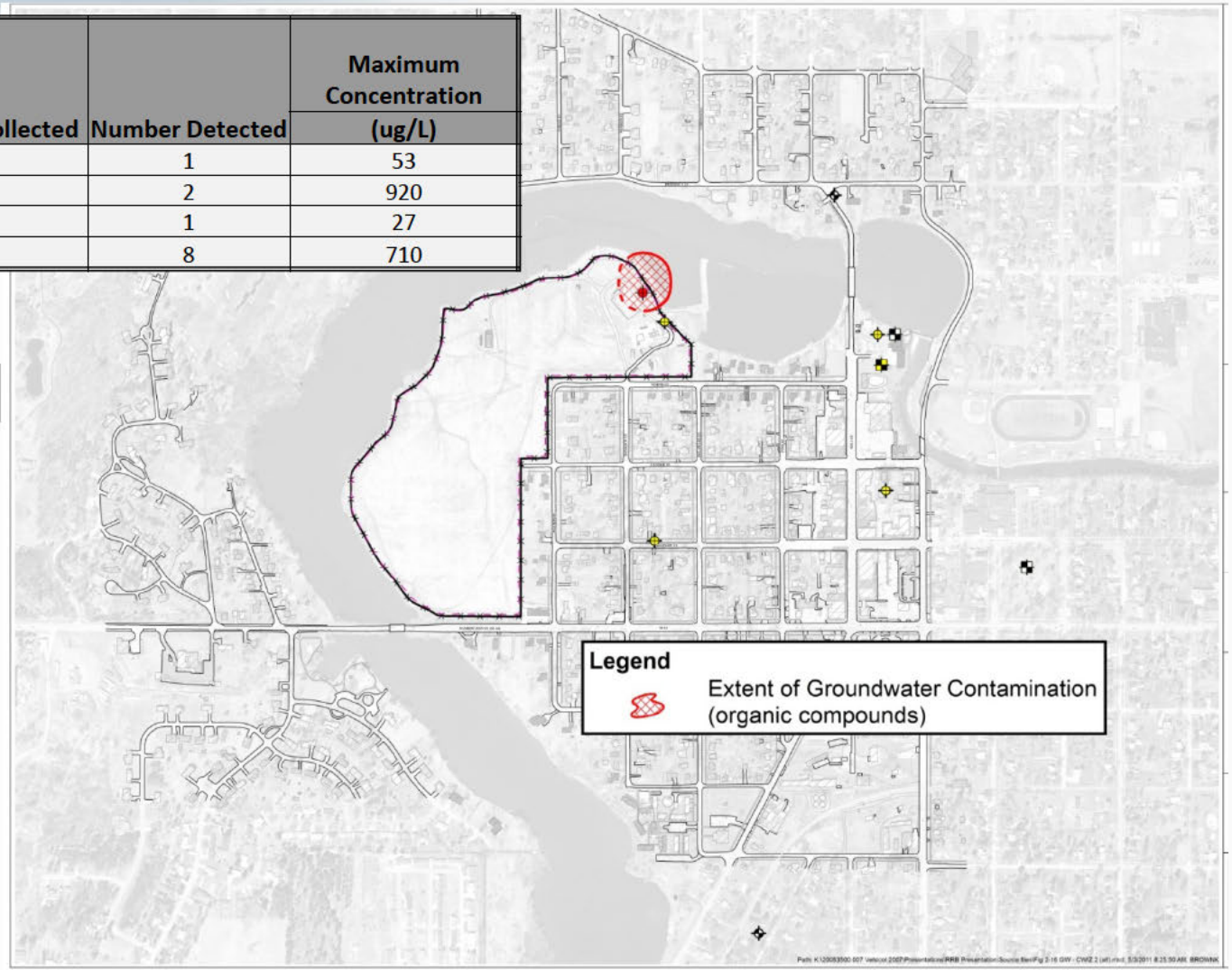
City Well Intake Zone 1

Analyte	Number Collected	Number Detected	Maximum Concentration (ug/L)
4,4-DDT	10	3	0.21
pCBSA	11	3	160

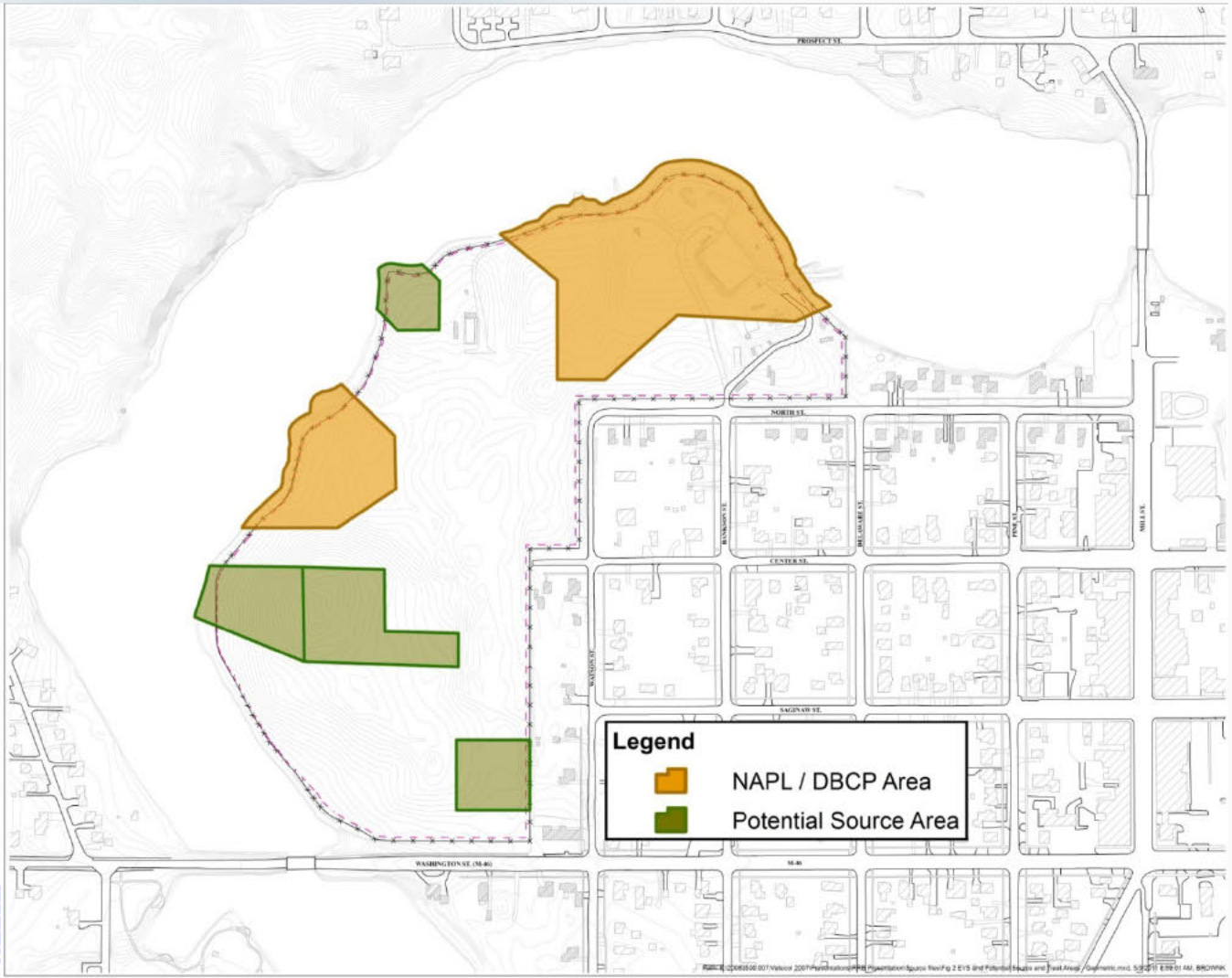


City Well Intake Zone 2

Analyte	Number Collected	Number Detected	Maximum Concentration (ug/L)
Benzene	11	1	53
Chlorobenzene	11	2	920
Trichloroethene	11	1	27
pCBSA	11	8	710

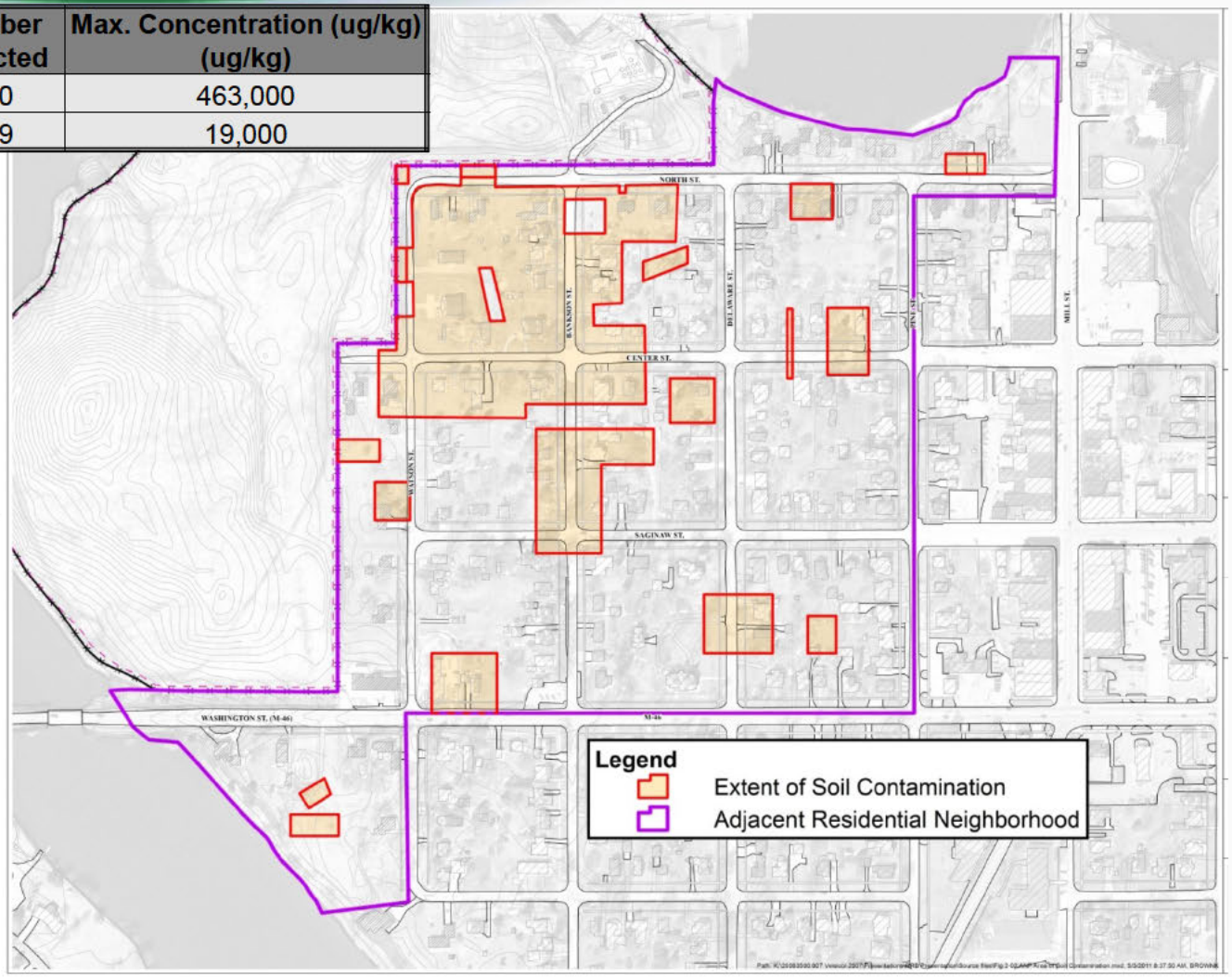


NAPL / DBCP Areas and Potential Source Areas



Adjacent Residential Neighborhood

Parameter	Number Collected	Number Detected	Max. Concentration (ug/kg) (ug/kg)
4,4-DDT	342	320	463,000
PBB	342	209	19,000



Remedial Action

For the nearby residential properties adjacent to the former chemical facility:

- Phase 1 – remediate 10 homes with PBB and DDT contamination in 2012
- Phase 2 – additional cleanup of 50+ homes

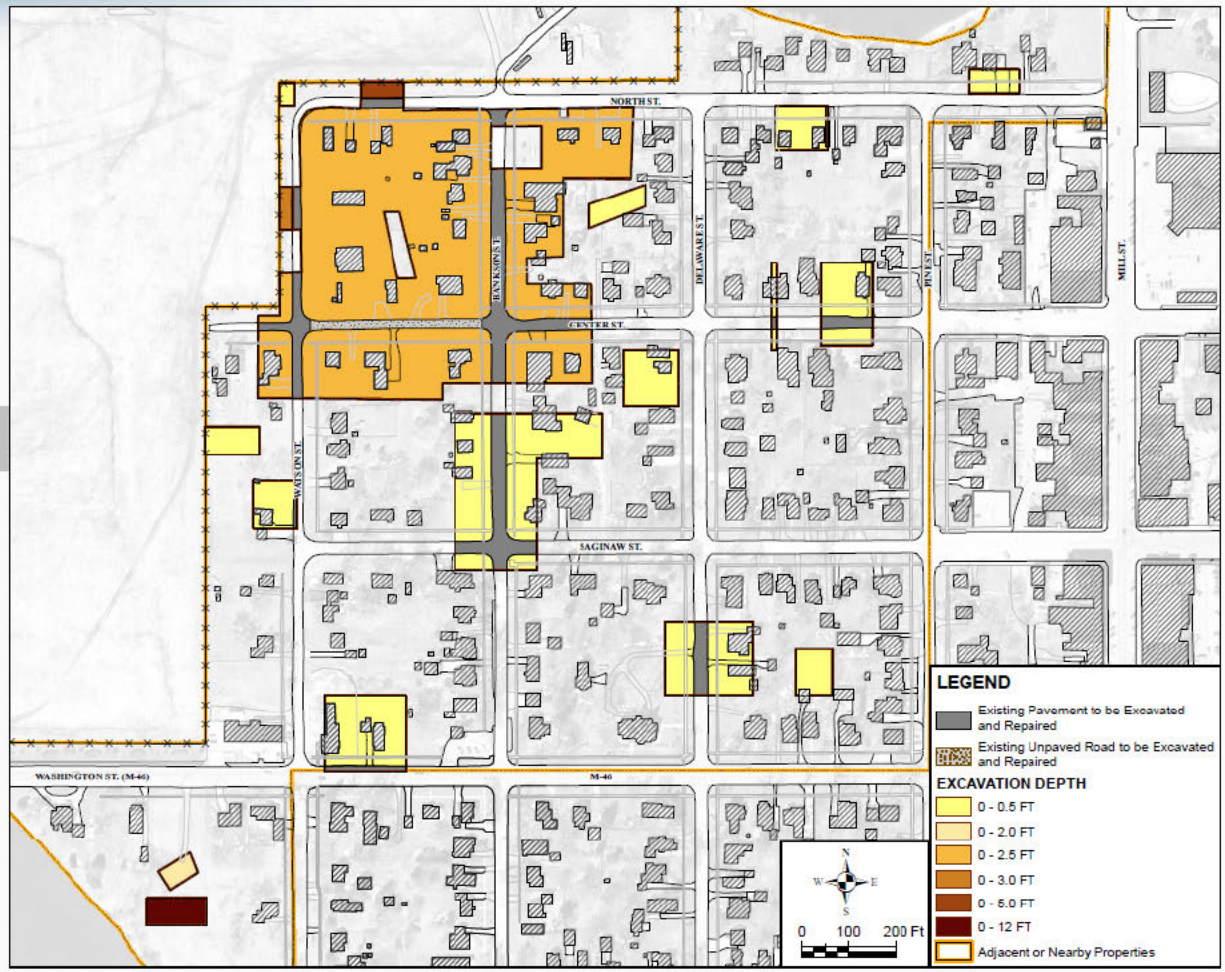
Remedial Action

For the former Velsicol Chemical facility:

- in-situ thermal treatment of DNAPL/DBCP principal threat waste soil areas;
- excavation and off-site disposal of principal threat waste soils;
- in-situ chemical oxidation for source area groundwater;
- replacement of the City of St, Louis municipal drinking water supply;
- installation of vertical barrier and perimeter drain surrounding site;
- installation of new groundwater/DNAPL collection trench;
- installation of DNAPL collection sump
- groundwater pump and treatment;
- installation of RCRA Subtitle C compliant cap;
- institutional controls

Residential Neighborhood Soil Excavation

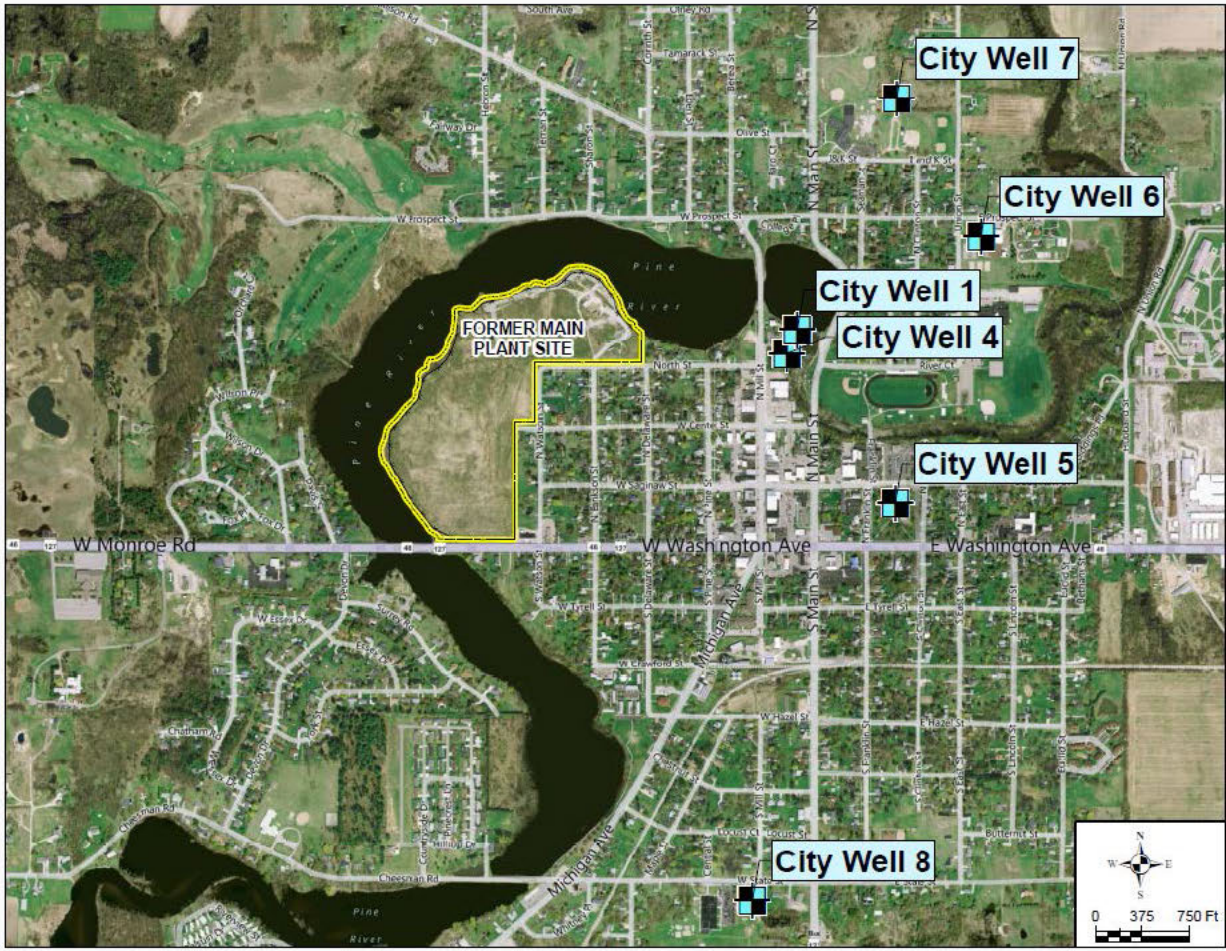
- Ecological and human health
- DDT, PBB, TRIS
- Soil excavation of approx. 40,000 CY
- Property owners/residents included in planning



Soil beneath buildings will not be excavated

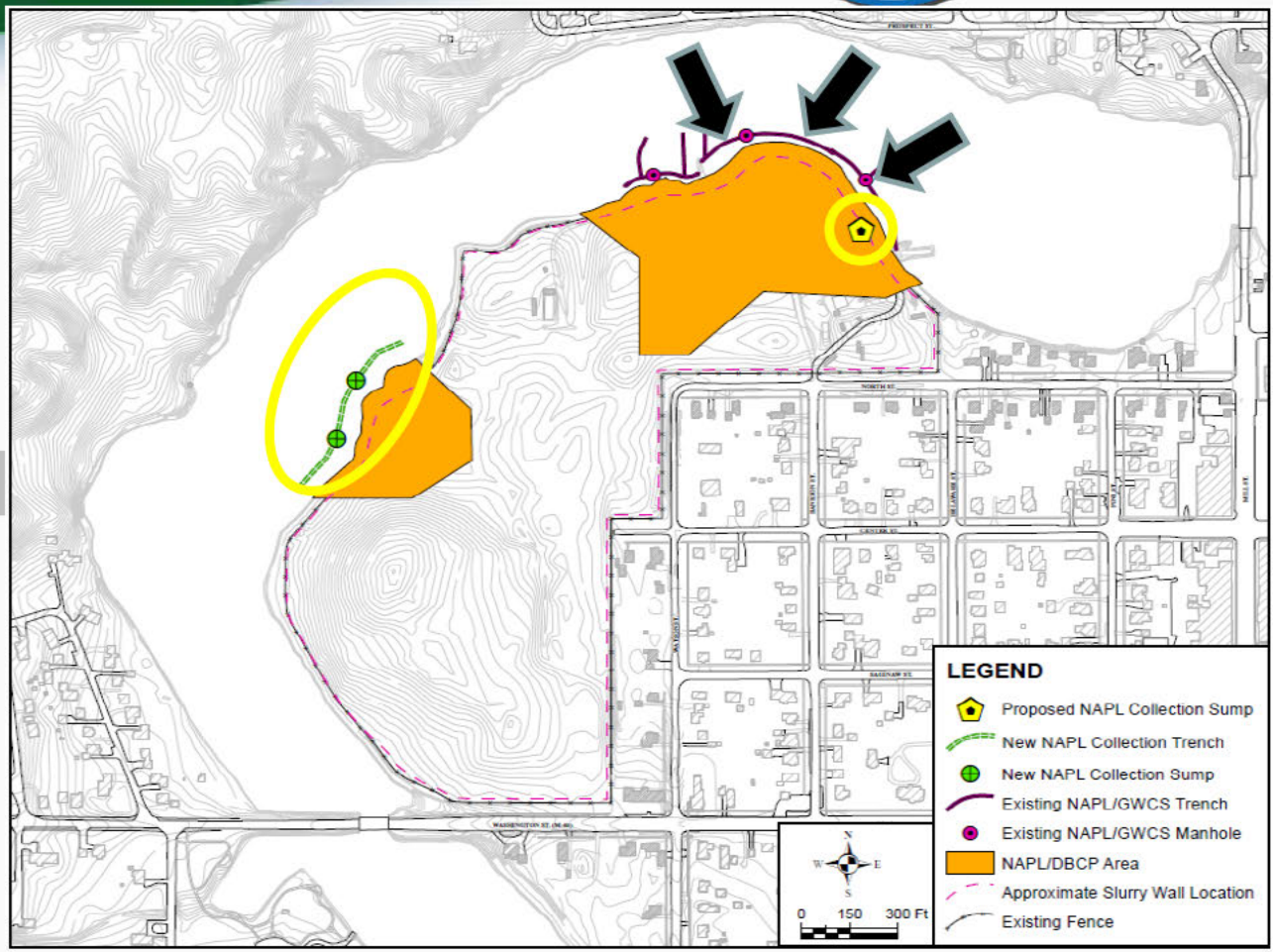
City Water Supply Replacement

- Assumed replacement of City well field with new
- Formation of joint water authority with Alma
- Exemption 5: DP
- Cost savings for groundwater pump and treat
- Would address risk to City water users



DNAPL Recovery

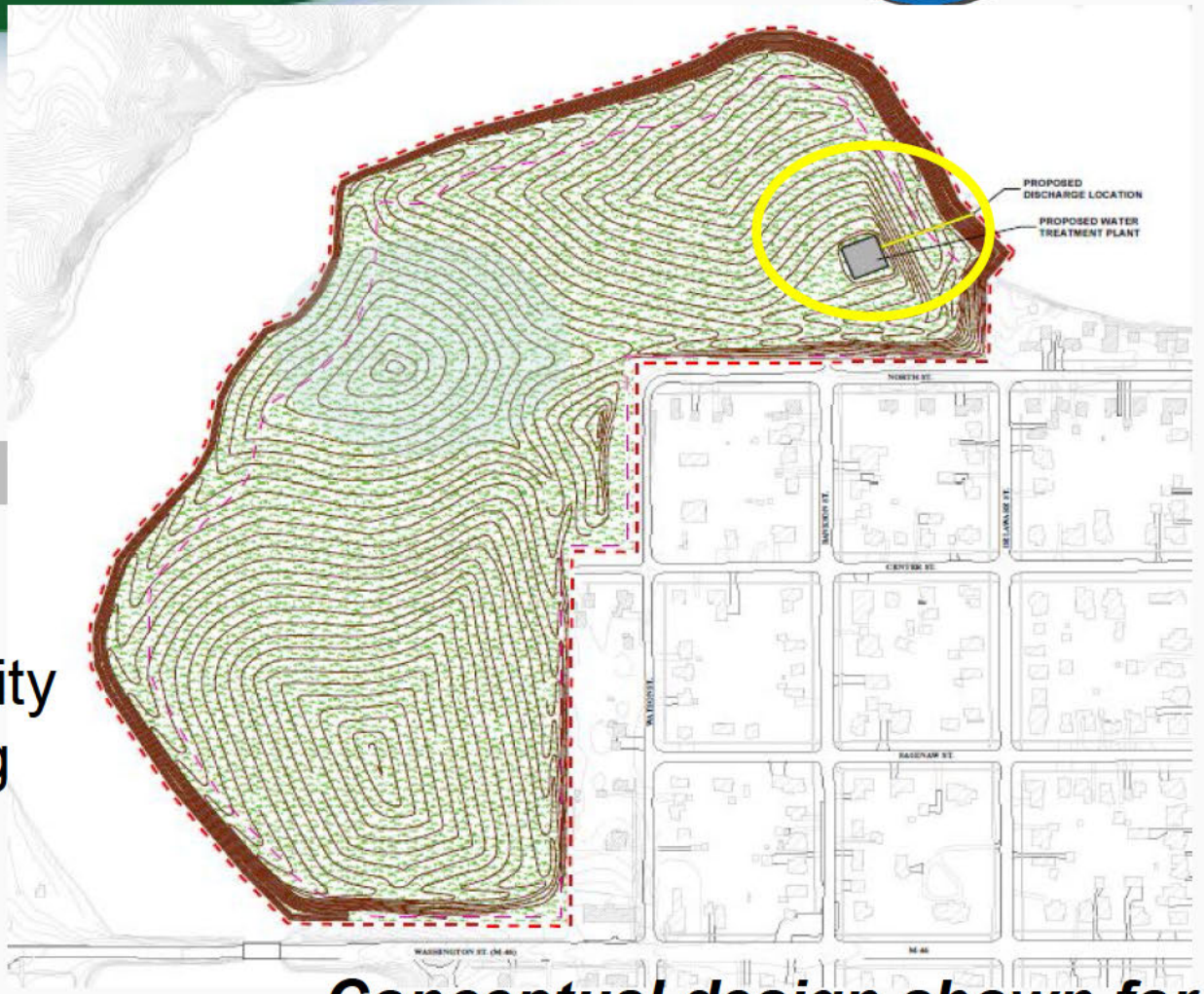
- Existing DNAPL collection system
- New DNAPL trenches, as needed
- Deep DNAPL recovery sump



DBCP = 1,2-dibromo-3-chloropropane
GWCS = Groundwater collection system
NAPL = Non-aqueous phase liquid

Site Restoration Plan

- Re-grade Site
- Seed and mulch
- New on-Site groundwater treatment plant
- Redevelopment possible
- Include community in reuse planning

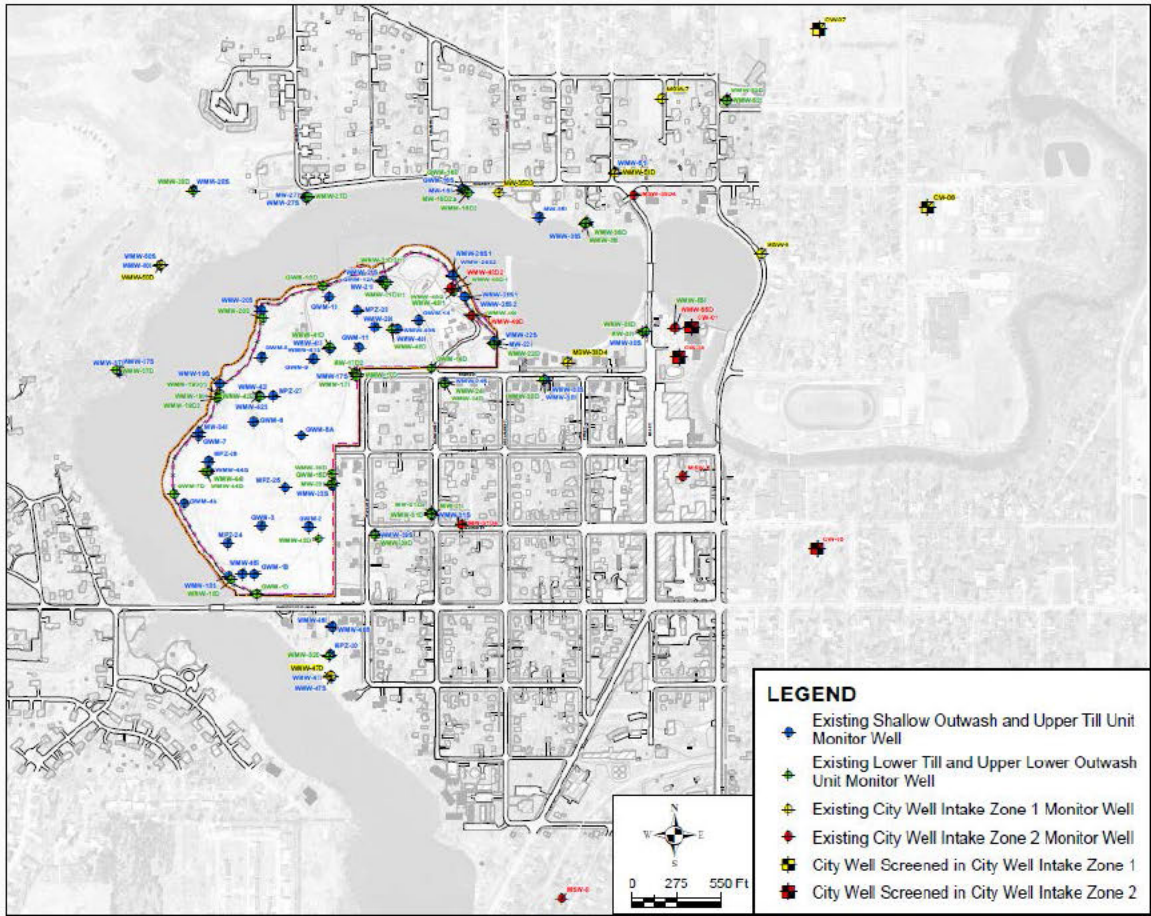


Conceptual design shown for FPS-2, FPS-3, and FPS-5

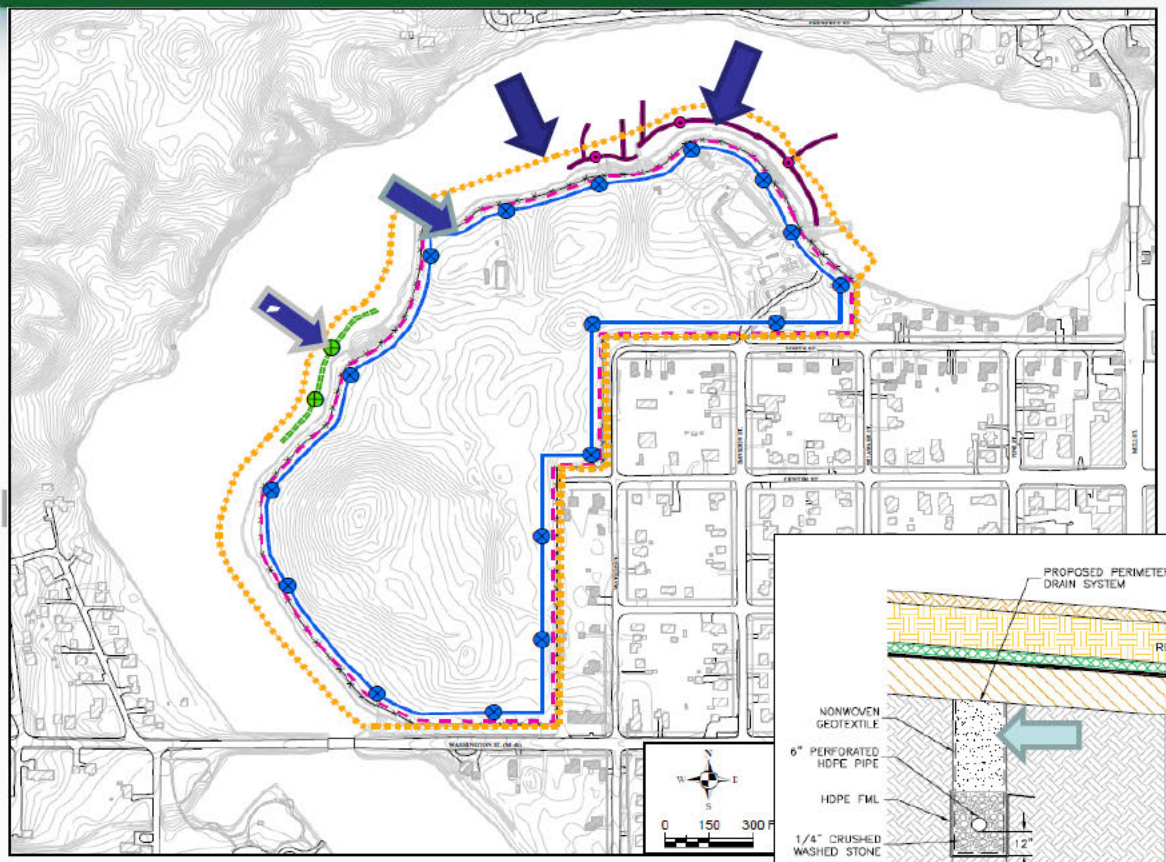
Groundwater Monitoring

- Existing monitoring network in place
- Optimize
- New monitoring plan will be developed
- Ensure remedy remains protective
- Review protectiveness at least every 5 years

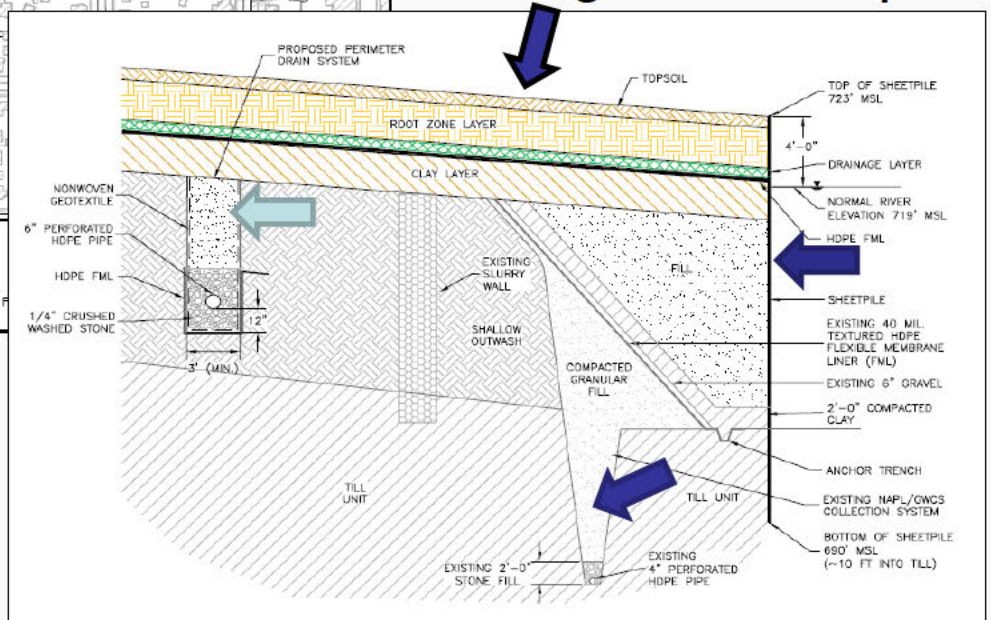
Existing groundwater well monitoring network



Containment Elements

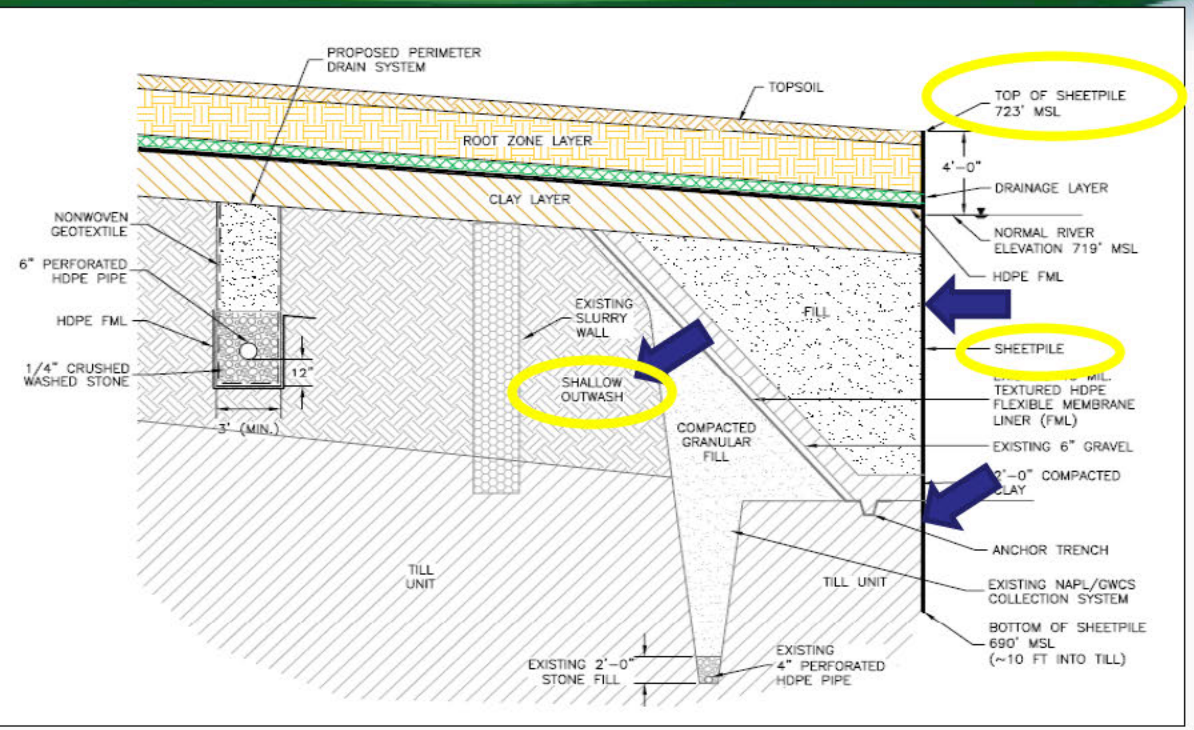


- Vertical barrier
- Perimeter drain
- Existing NAPL/GWCS
- New NAPL trenches, if needed
- Engineered cap



NAPL = Non-aqueous phase liquid
GWCS = Groundwater Collection System

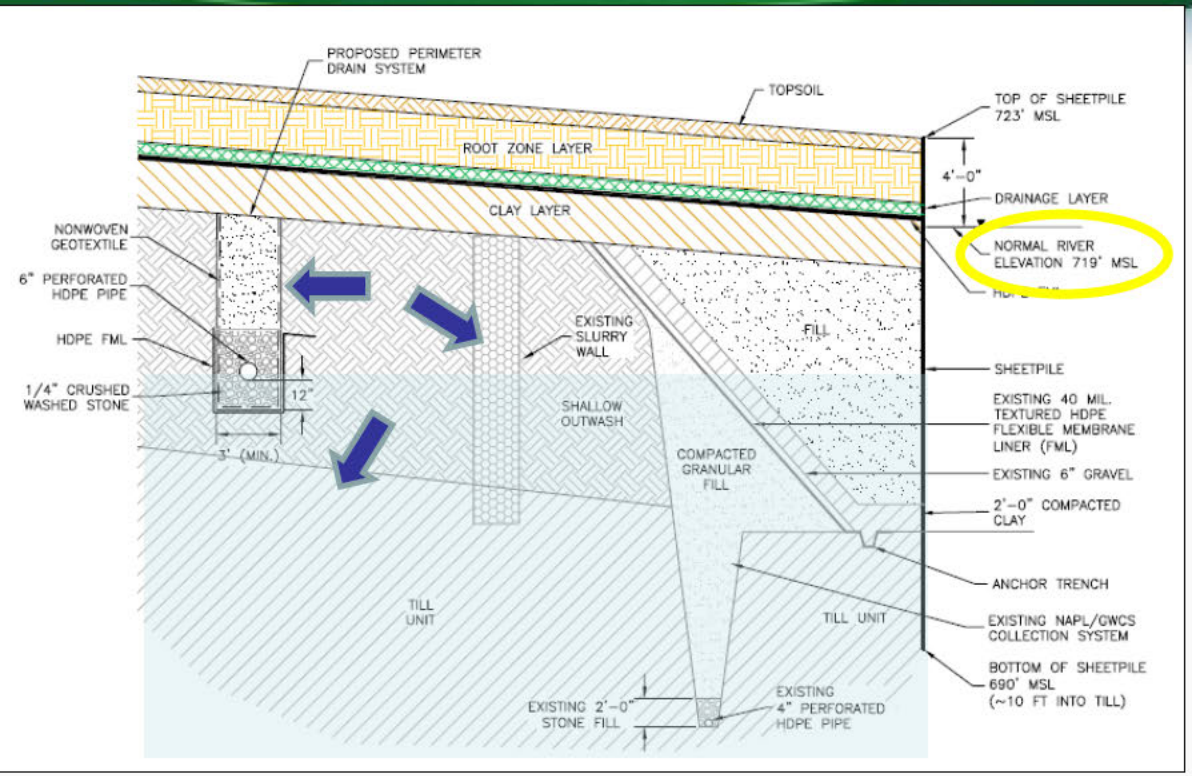
Vertical Barrier



slurry wall

- Containment of bank material
- Prevent off-site migration of contamination
- Primarily for shallow outwash unit

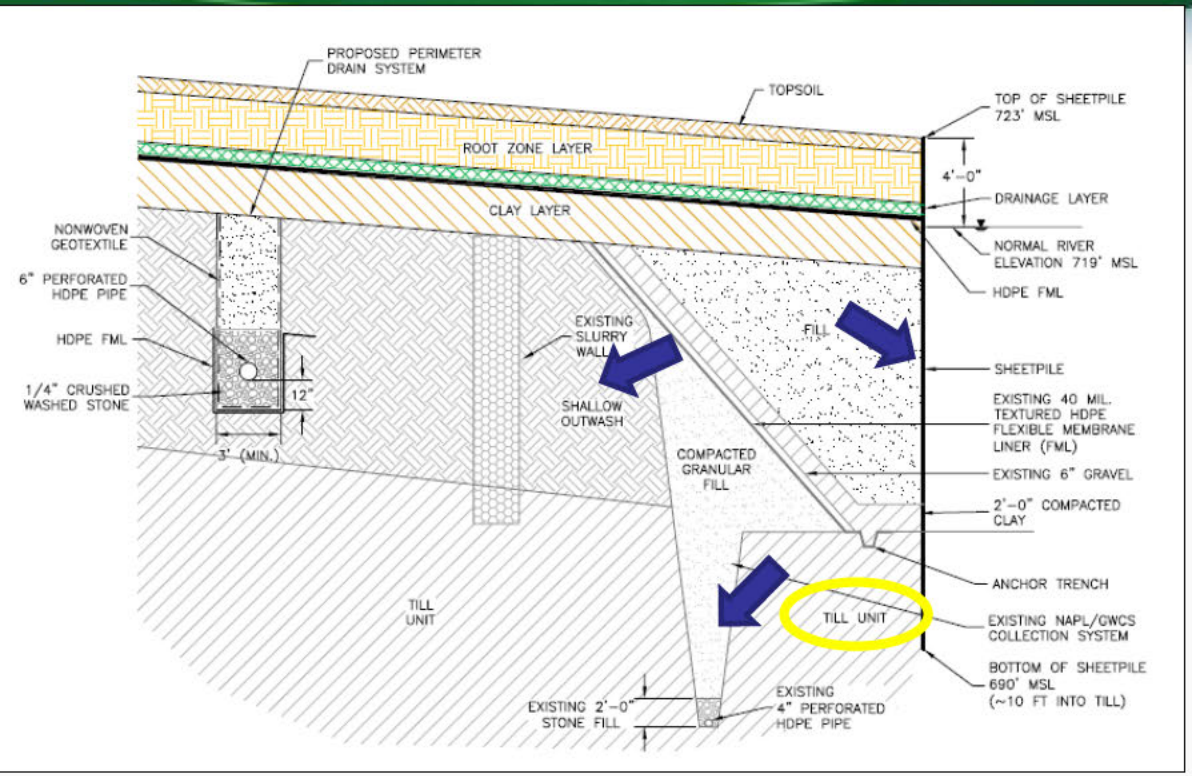
Perimeter Drain



WTP = (ground)Water treatment plant

- Groundwater collection trenches and sumps
- Installed interior to slurry wall around Plant Site perimeter
- Installed above till unit
- Control of water levels inside containment unit
- Maintain inward hydraulic gradient
- Treatment at WTP

Existing NAPL Trenches

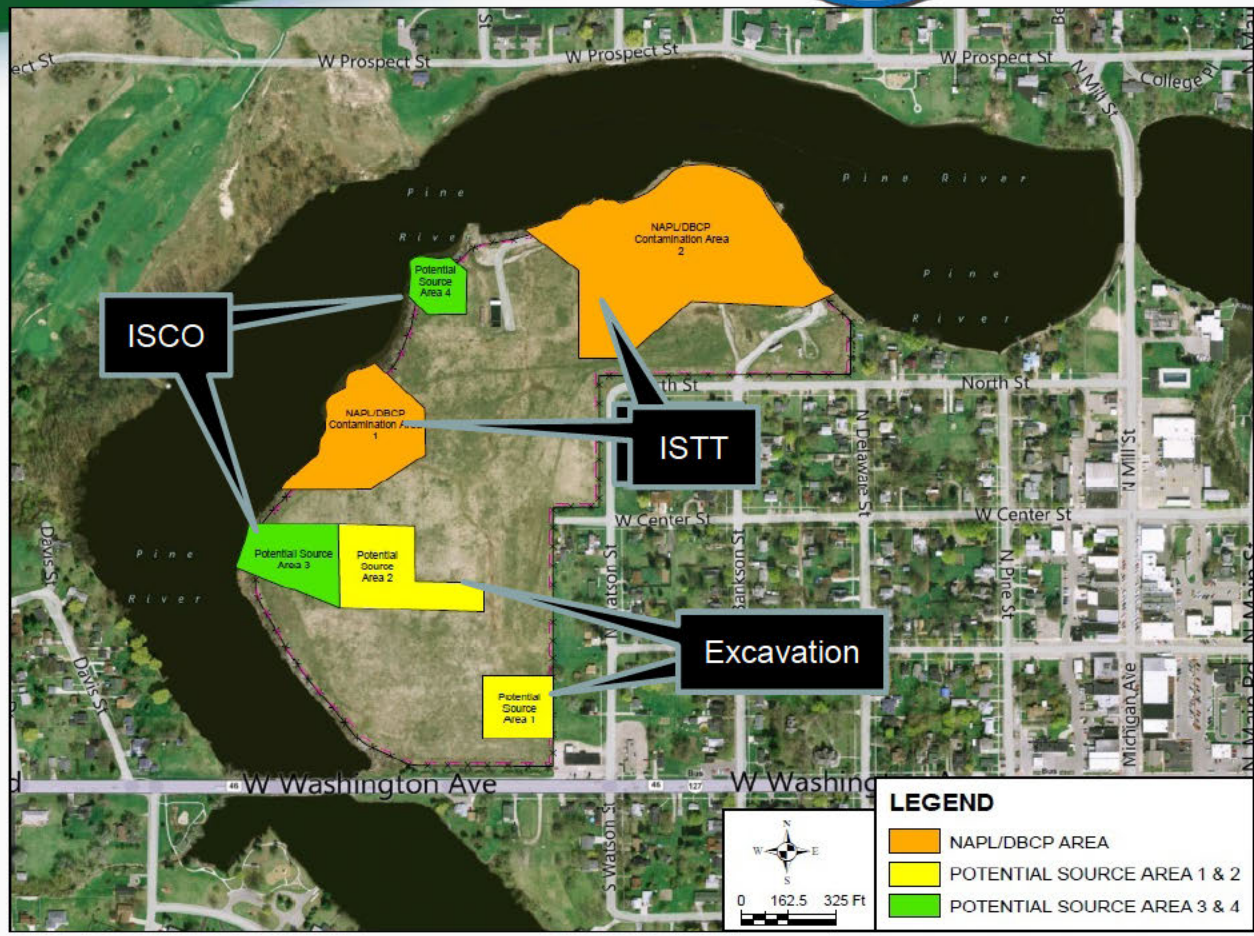


NAPL = Non-aqueous phase liquid
WTP = (ground)Water treatment plant

- NAPL/groundwater collection trenches and sumps
- New trenches and sumps, if needed
- Installed exterior to slurry wall and river bank
- Installed within the top of the till unit where NAPL was observed
- Collects NAPL and contaminated groundwater
- Treatment/ disposal at WTP

Treatment/Removal Plan

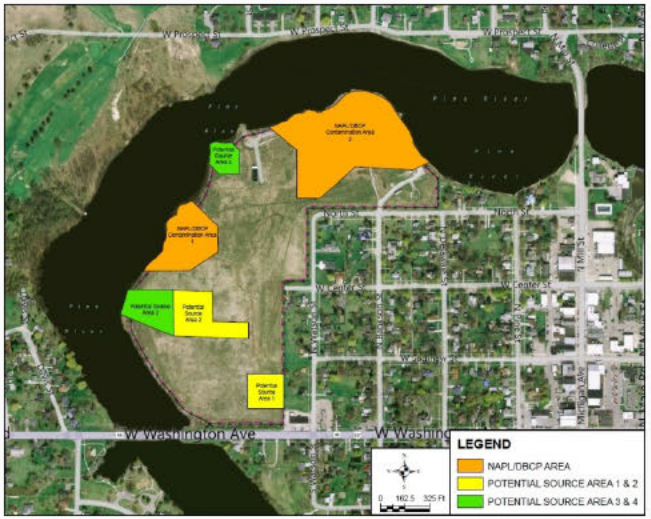
- ISTT for NAPL/DBCP Areas (117,214 yd^3)
- Excavation of PSAs 1 & 2 (42,939 yd^3 unsaturated)
- ISCO for PSAs 3 & 4 (32,151 yd^3 saturated)
- Bench/pilot-scale studies



***in situ* = "in place", in the subsurface**
***ISCO* = *In situ* chemical oxidation**
***ISTT* = *In situ* thermal treatment**
***PSA* = potential source area**

In-situ Thermal Treatment of NAPL/DBCP Areas

- Addresses Principle Threat Waste
  - (i.e. thermal destruction of NAPL and high contaminant concentrations)
- Greater protection of Pine River and groundwater
- Estimated 12 acres total and likely over 10,000 gallons of NAPL
- Pre-Design work needed:
  - Pre-Design Investigation
  - Pilot/bench-scale studies



ISTT = In situ thermal treatment
NAPL = Non-aqueous phase liquid

Remedial Action Costs

Alternative	Total Capital Cost	Total O&M Cost (50-year period)	Total Alternative Cost (Capital + O&M)
FPS-1	No Action; Not Applicable		
FPS-2	$94	$231	**$325**
Selected Remedy	$143	$230	**$373**
FPS-5	$186	$230	**$416**
FPS-7	$185	$295	**$480**

Costs are presented in millions of dollars (no present value analysis)
Includes adjacent neighborhood soil excavation
Includes $27M of capital costs to replace City of St. Louis well field

O&M = Operations and maintenance

Hot Buttons

Active and angry CAG.

High political interest from Senator Carl Levin, Senator Debbie Stabenow and Congressman David Camp.

May 2012 - Dead robins found in residential yards with lethal levels of DDE found in brain tissue.

City moving quickly to replace well field with their share of the settlement.